ABSTRACT OF THE DISCLOSURE

Post-translational O-sulfonation of a serine or threonine residue of proteins is detected, optionally comparatively, wherein the detected O-sulfonation is detected under a first physiological condition, and is compared with a control O-sulfonation detected under a second physiological condition, and a difference between the detected and control O-sulfonations indicates a difference between the first and second physiological conditions.

Predetermined changes in physiological conditions are used to infer specific changes in O-sulfonation. Proteins are modified by introducing a predetermined change in O-sulfonation at a serine or threonine residue of the protein, and optionally, detecting a resultant change in O-sulfonation. These methods include introducing or increasing O-sulfonation, eliminating or reducing O-sulfonation; and derivatizing or substituting O-sulfonation.